Collaborative Approaches to Scaling Up Restoration from the Site to the Tualatin River Watershed in Washington County, Oregon

2025 Ecological Restoration Symposium: Local Scales for Global Impacts

University of Washington Botanic Gardens

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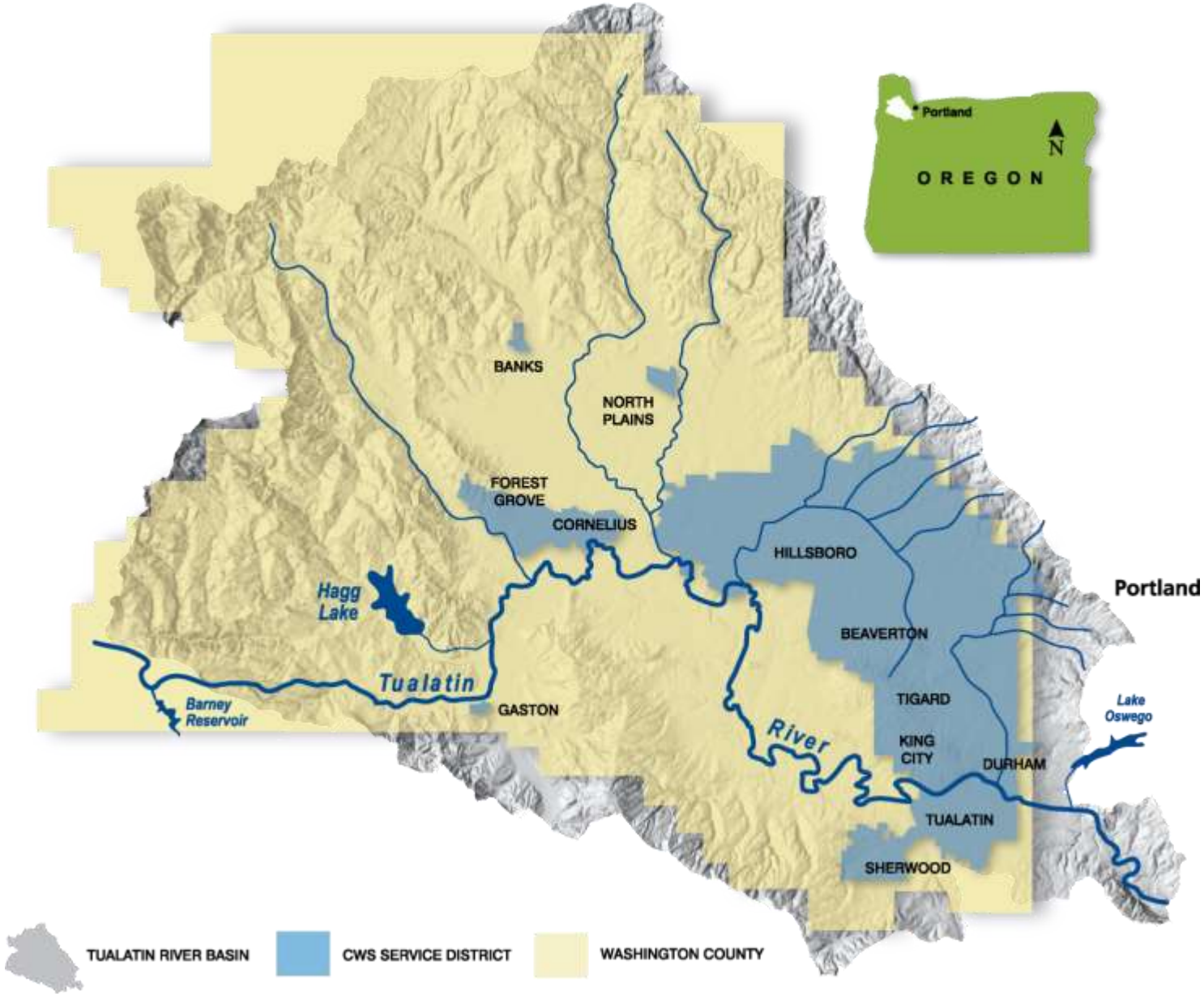
April 1, 2025

Outline

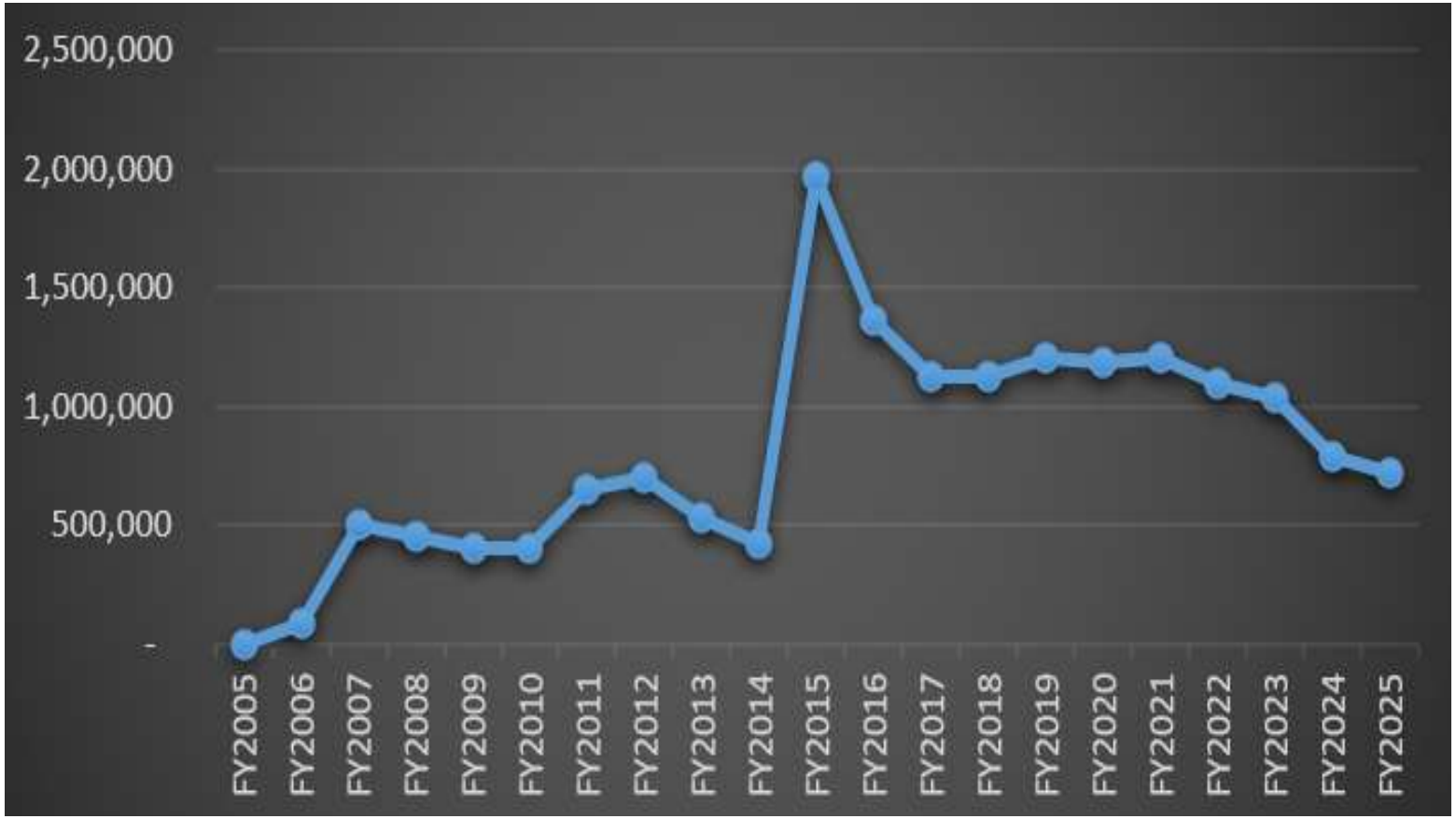
- Background
- Early Days
- Improvements (Rapid Riparian Revegetation)
- Long term management and site stewardship
- Takeaways

Background

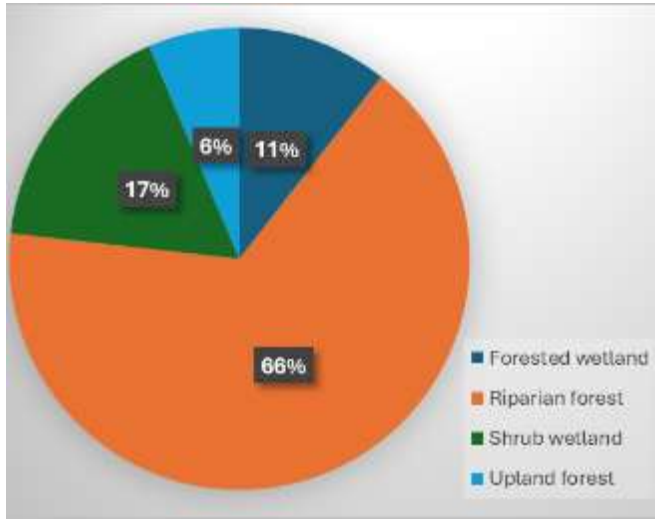
Why are we planting?



A snapshot: Clean Water Services Tualatin Basin planting numbers and habitat types



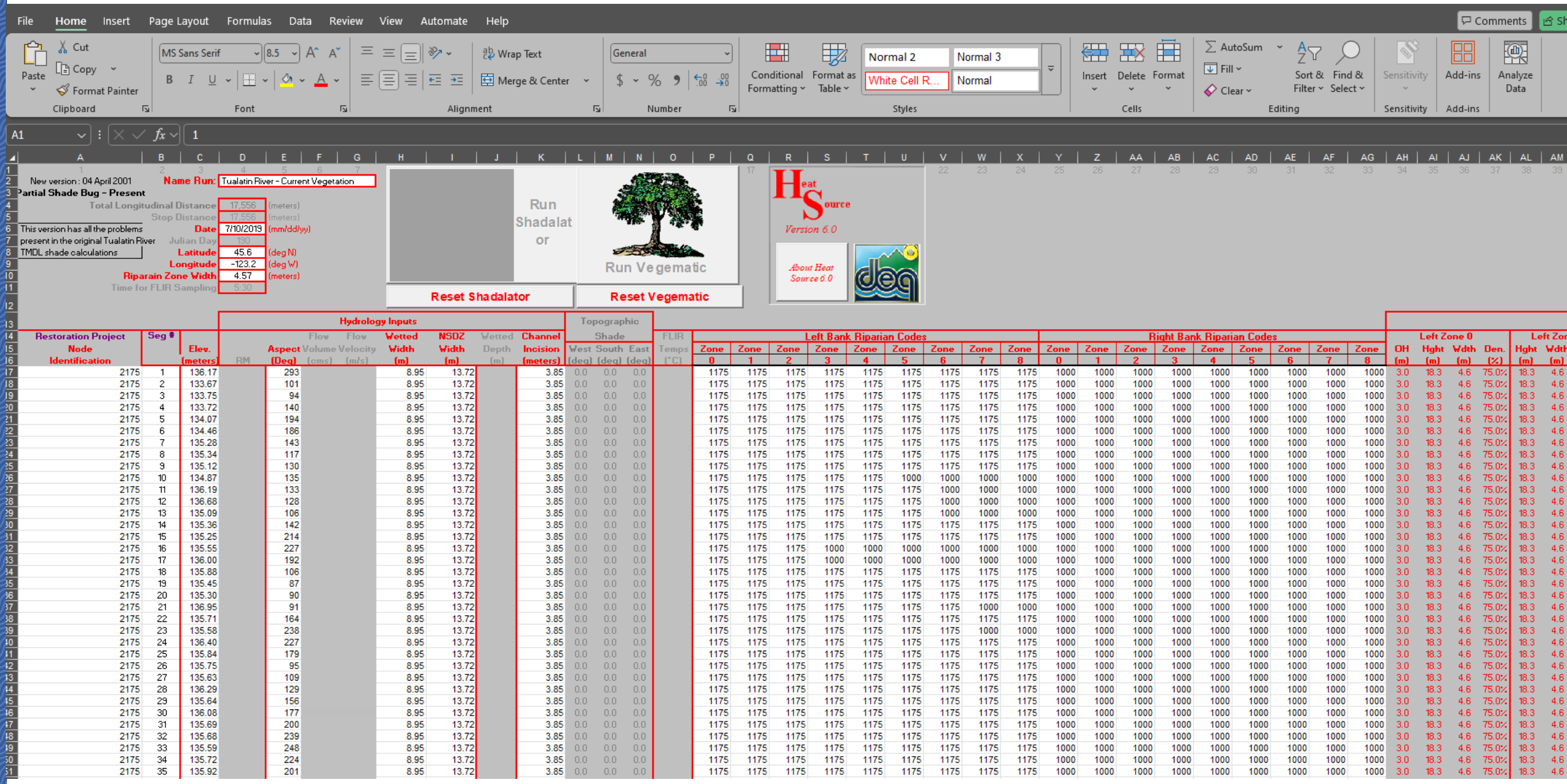
Planting: 17,000,000+ plants; 8,500+ acres; 240+ river miles



Planting by habitat 2005-2024

Slide courtesy of Peter Guillozet

Early Days



New version : 04 April 2001
Partial Shade Bug – Present
This version has all the problems present in the original Tualatin River TMDL shade calculations

Name Run: Tualatin River - Current Vegetation

Total Longitudinal Distance	17,556	(meters)
Stop Distance	17,556	(meters)
Date	7/10/2019	(mm/dd/yy)
Julian Day	190	
Latitude	45.6	(deg N)
Longitude	-123.2	(deg W)
Riparian Zone Width	4.57	(meters)
Time for FLIR Sampling	5:30	

Run Shadalator
Run Vegematic
Reset Shadalator
Reset Vegematic
Heat Source Version 6.0
About Heat Source 6.0

Restoration Project Node Identification	Seg #	Elev. (meters)	RM	Hydrology Inputs: Aspect (Deg)	Flow Volume (cms)	Flow Velocity (m/s)	Wetted Width (m)	NSDZ Width (m)	Wetted Depth (m)	Channel Incision (meters)	Topographic Shade: West (deg)	South (deg)	East (deg)	FLIR Temps (°C)	Left Bank Riparian Codes: Zone 0	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8	Right Bank Riparian Codes: Zone 0	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8	Left Zone 0: OH (m)	Hght (m)	Wdth (m)	Den. (%)	Left Zo Hght (m)	Left Zo Wdth (m)
2175	1	136.17		293			8.95	13.72		3.85	0.0	0.0	0.0		1175	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	3.0	18.3	4.6	75.0%	18.3	4.6
2175	2	133.67		101			8.95	13.72		3.85	0.0	0.0	0.0		1175	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	3.0	18.3	4.6	75.0%	18.3	4.6
2175	3	133.75		94			8.95	13.72		3.85	0.0	0.0	0.0		1175	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	3.0	18.3	4.6	75.0%	18.3	4.6
2175	4	133.72		140			8.95	13.72		3.85	0.0	0.0	0.0		1175	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	3.0	18.3	4.6	75.0%	18.3	4.6
2175	5	134.07		194			8.95	13.72		3.85	0.0	0.0	0.0		1175	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	3.0	18.3	4.6	75.0%	18.3	4.6
2175	6	134.46		186			8.95	13.72		3.85	0.0	0.0	0.0		1175	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	3.0	18.3	4.6	75.0%	18.3	4.6
2175	7	135.28		143			8.95	13.72		3.85	0.0	0.0	0.0		1175	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	3.0	18.3	4.6	75.0%	18.3	4.6
2175	8	135.34		117			8.95	13.72		3.85	0.0	0.0	0.0		1175	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	3.0	18.3	4.6	75.0%	18.3	4.6
2175	9	135.12		130			8.95	13.72		3.85	0.0	0.0	0.0		1175	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	3.0	18.3	4.6	75.0%	18.3	4.6
2175	10	134.87		135			8.95	13.72		3.85	0.0	0.0	0.0		1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	3.0	18.3	4.6	75.0%	18.3	4.6
2175	11	136.19		133			8.95	13.72		3.85	0.0	0.0	0.0		1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	3.0	18.3	4.6	75.0%	18.3	4.6
2175	12	136.68		128			8.95	13.72		3.85	0.0	0.0	0.0		1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	3.0	18.3	4.6	75.0%	18.3	4.6
2175	13	135.09		106			8.95	13.72		3.85	0.0	0.0	0.0		1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	3.0	18.3	4.6	75.0%	18.3	4.6
2175	14	135.36		142			8.95	13.72		3.85	0.0	0.0	0.0		1175	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	3.0	18.3	4.6	75.0%	18.3	4.6
2175	15	135.25		214			8.95	13.72		3.85	0.0	0.0	0.0		1175	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	3.0	18.3	4.6	75.0%	18.3	4.6
2175	16	135.55		227			8.95	13.72		3.85	0.0	0.0	0.0		1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	3.0	18.3	4.6	75.0%	18.3	4.6
2175	17	136.00		192			8.95	13.72		3.85	0.0	0.0	0.0		1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	3.0	18.3	4.6	75.0%	18.3	4.6
2175	18	135.88		106			8.95	13.72		3.85	0.0	0.0	0.0		1175	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	3.0	18.3	4.6	75.0%	18.3	4.6
2175	19	135.45		87			8.95	13.72		3.85	0.0	0.0	0.0		1175	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	3.0	18.3	4.6	75.0%	18.3	4.6
2175	20	135.30		90			8.95	13.72		3.85	0.0	0.0	0.0		1175	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	3.0	18.3	4.6	75.0%	18.3	4.6
2175	21	136.95		91			8.95	13.72		3.85	0.0	0.0	0.0		1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	3.0	18.3	4.6	75.0%	18.3	4.6
2175	22	135.71		164			8.95	13.72		3.85	0.0	0.0	0.0		1175	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	3.0	18.3	4.6	75.0%	18.3	4.6
2175	23	135.58		238			8.95	13.72		3.85	0.0	0.0	0.0		1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	3.0	18.3	4.6	75.0%	18.3	4.6
2175	24	136.40		227			8.95	13.72		3.85	0.0	0.0	0.0		1175	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	3.0	18.3	4.6	75.0%	18.3	4.6
2175	25	135.84		179			8.95	13.72		3.85	0.0	0.0	0.0		1175	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	3.0	18.3	4.6	75.0%	18.3	4.6
2175	26	135.75		95			8.95	13.72		3.85	0.0	0.0	0.0		1175	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	3.0	18.3	4.6	75.0%	18.3	4.6
2175	27	135.63		109			8.95	13.72		3.85	0.0	0.0	0.0		1175	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	3.0	18.3	4.6	75.0%	18.3	4.6
2175	28	136.29		129			8.95	13.72		3.85	0.0	0.0	0.0		1175	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	3.0	18.3	4.6	75.0%	18.3	4.6
2175	29	135.64		156			8.95	13.72		3.85	0.0	0.0	0.0		1175	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	3.0	18.3	4.6	75.0%	18.3	4.6
2175	30	136.08		177			8.95	13.72		3.85	0.0	0.0	0.0		1175	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	3.0	18.3	4.6	75.0%	18.3	4.6
2175	31	135.69		200			8.95	13.72		3.85	0.0	0.0	0.0		1175	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	3.0	18.3	4.6	75.0%	18.3	4.6
2175	32	135.68		239			8.95	13.72		3.85	0.0	0.0	0.0		1175	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	3.0	18.3	4.6	75.0%	18.3	4.6
2175	33	135.59		248			8.95	13.72		3.85	0.0	0.0	0.0		1175	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	3.0	18.3	4.6	75.0%	18.3	4.6
2175	34	135.72		224			8.95	13.72		3.85	0.0	0.0	0.0		1175	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	3.0	18.3	4.6	75.0%	18.3	4.6
2175	35	135.92		201			8.95	13.72		3.85	0.0	0.0	0.0		1175	1175	1175	1175	1175	1175	1175	1175	1175	1000	1000	1000	1000	1000	1000	1000	1000	1000	3.0	18.3	4.6	75.0%	18.3	4.6


NORTH
FERN HILL

Early Days

Early Days

Tree Planting Challenge – 2 million trees in 20 years

Community	Population 2003	Total Tree Target	Planting Targets Per Year 2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016-2025	$20k/ac, $2.5/plant, (2614 plants/ac)
Banks	1430	4,290	107	215	322	429	536	644	536	429	322	215	107	429	$43,548
Beaverton	79010	237,030	5926	11852	17777	23703	29629	35555	29629	23703	17777	11852	5926	23703	$2,406,117
Cornelius	10150	30,450	761	1523	2284	3045	3806	4568	3806	3045	2284	1523	761	3045	$309,101
Durham	1400	4,200	105	210	315	420	525	630	525	420	315	210	105	420	$42,635
Forest Grove	19130	57,390	1435	2870	4304	5739	7174	8609	7174	5739	4304	2870	1435	5739	$582,572
Hillsboro	79340	238,020	5951	11901	17852	23802	29753	35703	29753	23802	17852	11901	5951	23802	$2,416,167
King City	2100	6,300	158	315	473	630	788	945	788	630	473	315	158	630	$63,952
North Plains	1640	4,920	123	246	369	492	615	738	615	492	369	246	123	492	$49,943
Portland (in Basin est)	70000	210,000	5250	10500	15750	21000	26250	31500	26250	21000	15750	10500	5250	21000	$2,131,733
Sherwood	14060	42,150	1054	2108	3161	4215	5269	6323	5269	4215	3161	2108	1054	4215	$427,869
Tigard	45130	135,390	3385	6770	10154	13539	16924	20309	16924	13539	10154	6770	3385	13539	$1,374,359
Tualatin	24790	74,370	1859	3719	5578	7437	9296	11156	9296	7437	5578	3719	1859	7437	$754,938
Clean Water Services*	40,490	1012	2025	3037	4049	5061	6074	5061	4049	3037	2025	1012	4049	$411,018	
Community Tree Total	**472600**	**1,085,000**	**27,125**	**54,250**	**81,375**	**108,500**	**135,625**	**162,750**	**135,625**	**108,500**	**81,375**	**54,250**	**27,125**	**108,500**	
Total Cost Per Year			**$275,349**	**$550,698**	**$826,047**	**$1,101,395**	**$1,376,744**	**$1,652,093**	**$1,376,744**	**$1,101,395**	**$826,047**	**$550,698**	**$275,349**	**$1,101,395**	**$11,013,954**
*Clean Water Services	124430	915,000													
Total Trees Planted		2,000,000													

CWS planting at capital projects between 2005-2010. The costs are accounted for in the capital projects list. District will cover City costs for Banks, Durham, King City, and North Plains

Slide courtesy of Peter Guillozet

Early Days


JOSCELYN
NORWALK
PADDINGTON


2021


2022

Improvements

Greenway Park, Beaverton, OR

2010

2021

Slide courtesy of Peter Guillozet

Shrub/tree ratio: Seeking the right balance

thicket-forming shrubs

small shrubs

arborescent shrubs

small trees

large trees

Slide courtesy of Peter Guillozet

Shrub/tree ratio contd.

Western Oregon reference site data

Plant Type	Stems/ Acre
Shrubs	4,012 (83%)
Trees	845 (17%)
Total	4,857

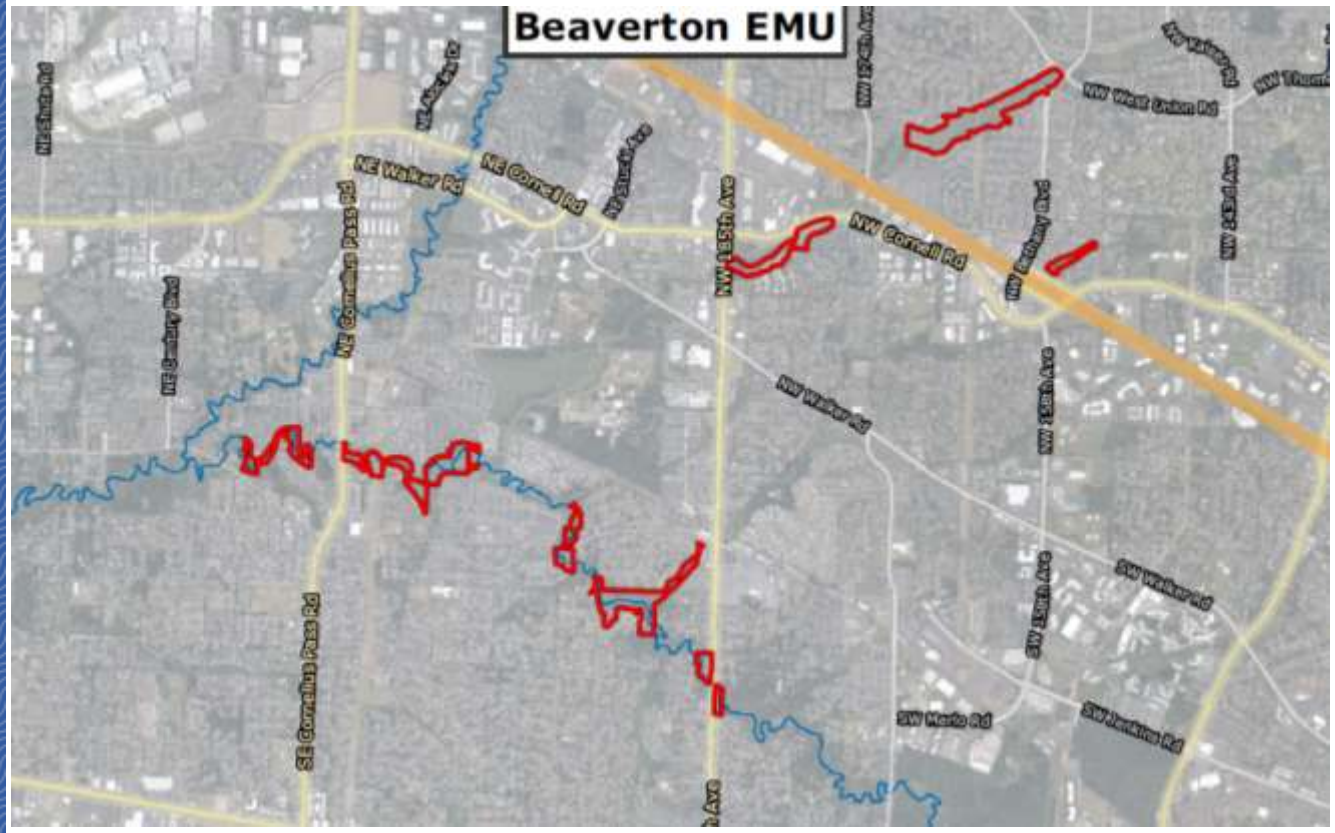
Plant Type/Form		Relative Planting Density	Key Structural Role	Key Ecological Role
Shrubs	Thicket-forming	High	Ground cover/ sub-canopy	Cover, foraging & nesting
	Small			
	Arborescent	Med	Mid-canopy	
Trees	Small			
	Large	Low	Overstory	Perching, foraging, nesting, hibernation Terrestrial & aquatic large wood

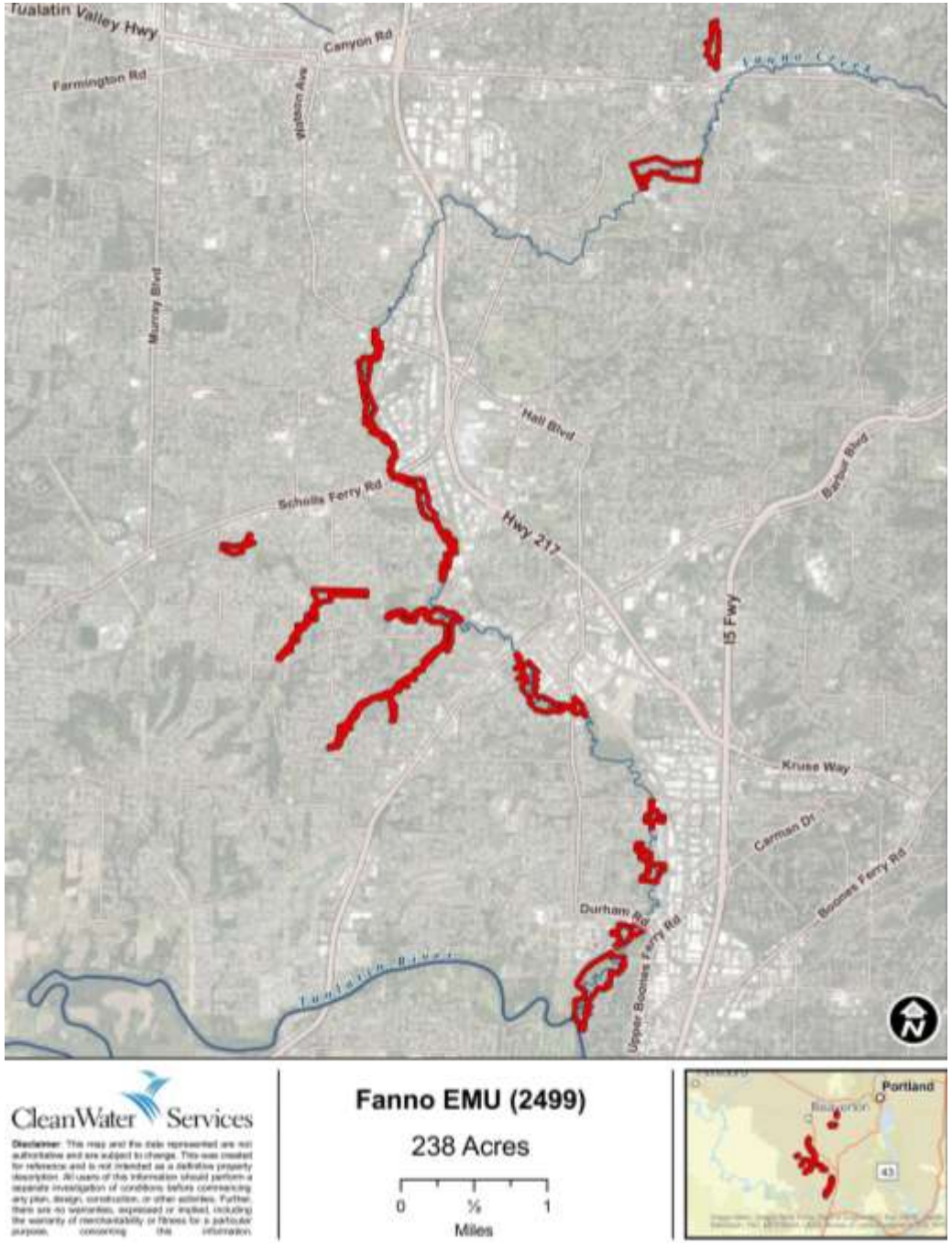
Slide courtesy of Peter Guillozet

Long Term Stewardship

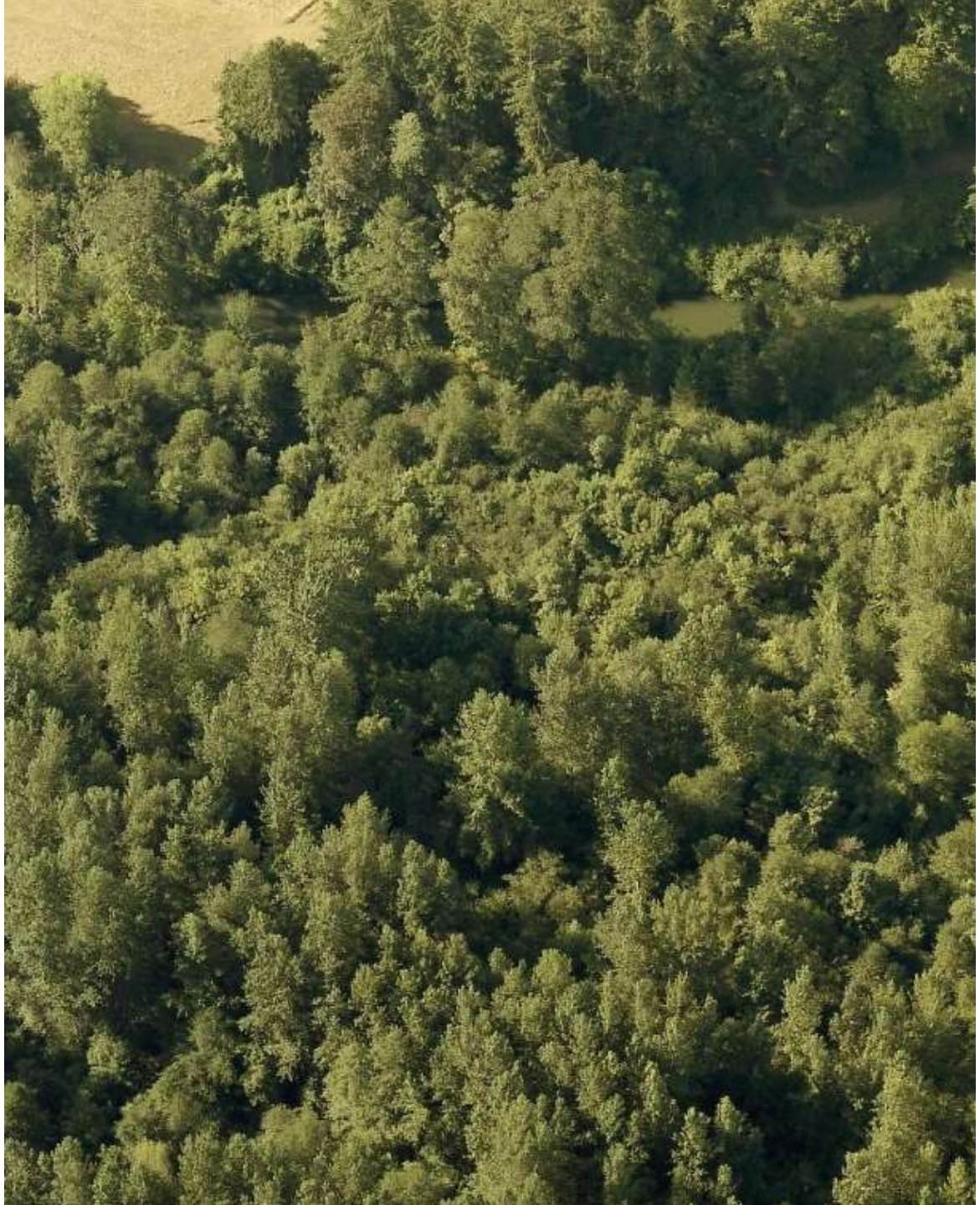
- Ecological Management Unit (EMU) model

Long Term Stewardship

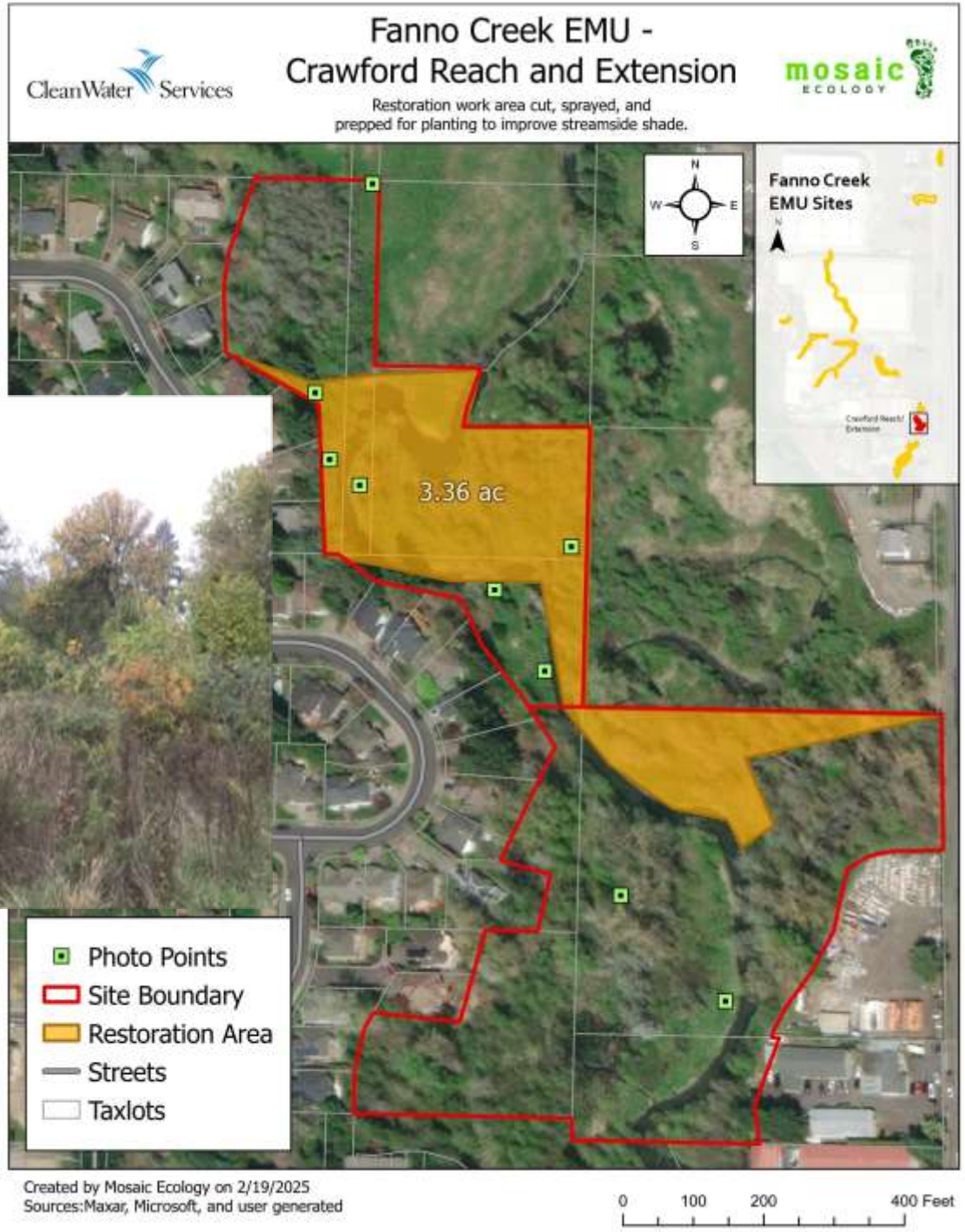


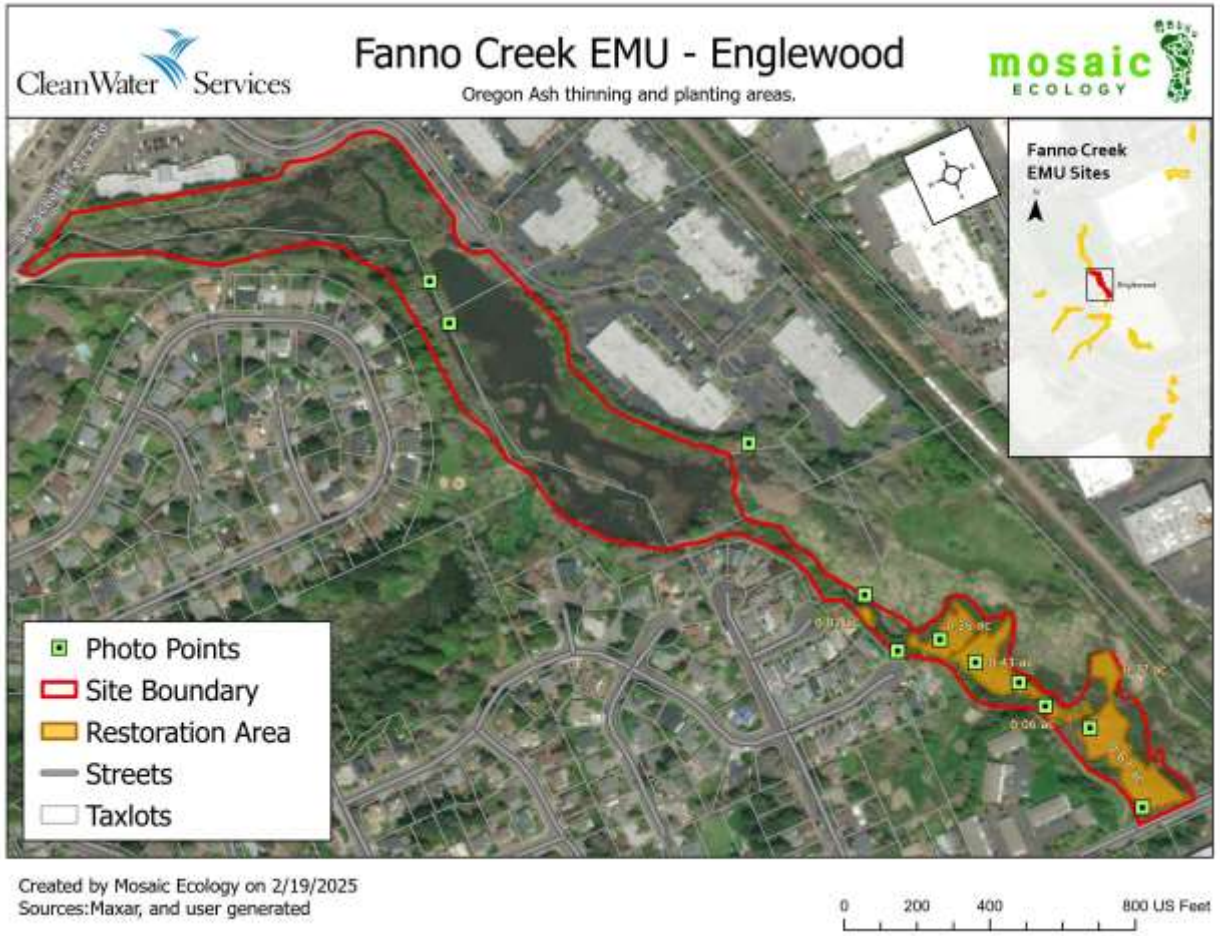


Long Term Stewardship



Long Term Stewardship




Clean Water Services
Fanno Creek EMU - Englewood
Oregon Ash thinning and planting areas.
mosaic ECOLOGY
Fanno Creek EMU Sites
Photo Points
Site Boundary
Restoration Area
Streets
Taxlots
Created by Mosaic Ecology on 2/19/2025
Sources:Maxar, and user generated
0
200
400
800 US Feet

Outstanding Challenges

Highlights

A State Response to Emerald Ash Borer with a Slow Ash Mortality Approach

Authors: Emily Perkins[1], Max Ragozzino[1], Matt Mills[2]

[1] Oregon Department of Agriculture, [2] Oregon Department of Forestry

ckground

nis, (EAB) has decimated healthy ash trees decades. EAB larvae feed in S-shaped galleries ability to transport water and nutrients. EAB June 2022, making it the first sighting west of Colorado. Oregon's EAB Readiness and Response Plan designated Oregon Department of Agriculture (ODA) to lead the initial field response. A quarantine was placed on Washington County to prevent movement of ash, white fringe and olive wood out of the county. Infested trees found near the initial detection were removed and destroyed. By the end of that year, 2191 visual surveys of ash trees were conducted for signs of EAB damage, and 55 positive trees were found. This revealed a relatively low density of infested trees and yielded a 1.1 mi² known infestation zone.

2024 Work Plan and Results

A total of 284 trees were treated, and 215 trap trees were created and debarked. They were divided into three site types:

- **Sink:** Clusters of 5-15 trap and treatment trees were established within the infestation area to sink and destroy the EAB population. Evidence of EAB was found in 30 of the 50 trap trees.
- **SLAM:** Clusters of one trap tree and two treatment trees were placed every 0.25 miles around the perimeter of the infestation. Evidence of EAB was found in 10 of the 117 traps trees, including 7 newly infested properties.
- **Sentry:** One trap tree was selected every 0.5 miles for detection outside of the infestation area. None of the 48 trap trees had evidence of EAB.

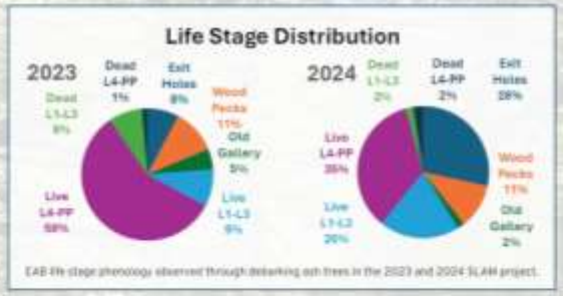
A high number of young larvae (L1-L3) were found in Sink and SLAM trees, indicating these larvae are feeding for 2 years before emerging as adults. The known infested area expanded to 16.2 mi², with an average density of 25.0 EAB per square meter.

2023 Work Plan and Results

SLAM: A "Ring of Fire" was created by selecting clusters of one trap tree and two treatment trees every 0.25 miles around the known infestation. In spring, 109 trap trees were created and 187 trees were treated, protecting them from EAB for 2-3 years. In the fall, the trap trees were felled and three sample logs, measuring one meter each, were selected from each tree: one below the canopy, one at the start of the canopy, and one within the canopy. These logs were debarked to search for EAB presence and record its life stages. Evidence of EAB was found in 17 trap trees, with an average density of 17.2 individuals per square meter. During that year, 3128 visual surveys were completed and 78 were positive. Based on the collected data, the known infested area expanded to 10.4 mi².

Slowing Ash Mortality Approach

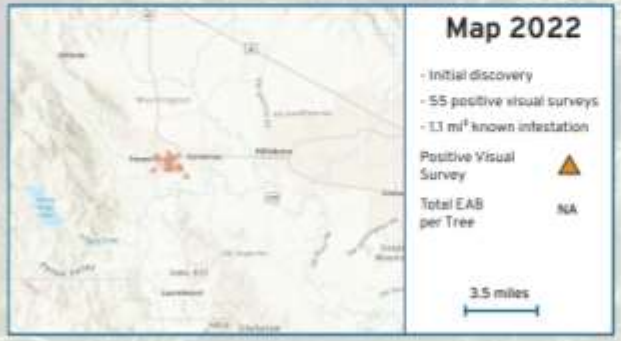
In February of 2023, EAB experts from USDA and USFS collaborated with ODA, Oregon Department of Forestry, Metro, Clean Water Services and Tualatin Soil and Water Conservation District to develop the Slow Ash Mortality (SLAM) method for Oregon. To locate potential SLAM sites, waterways were followed to identify corridors of ash trees on public and private properties. Property owners were contacted to gain permission and access to their ash trees. At each site, a trap tree was selected to girdle and become water stressed to attract EAB. One to three healthy trees near the trap tree were selected to treat with a systemic trunk injection of emamectin benzoate to kill any lingering beetles.

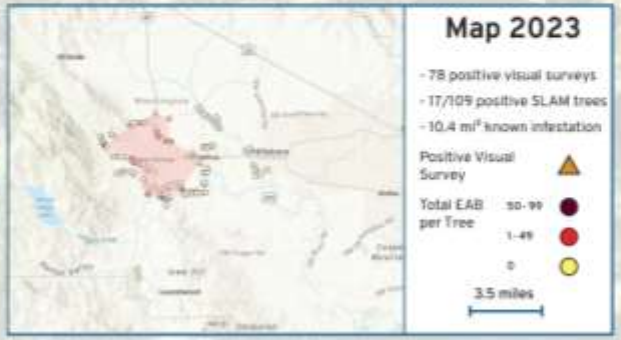


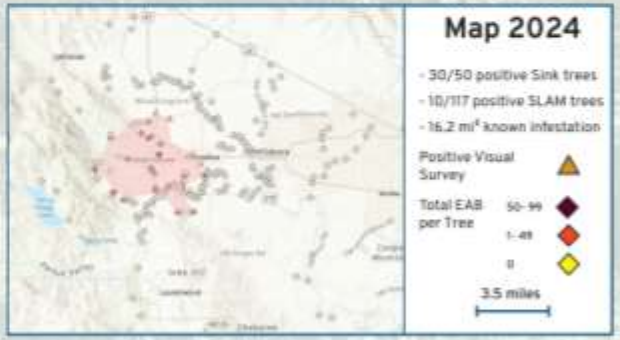
EAB life stage phenology observed through debarking ash trees in the 2023 and 2024 SLAM project.

Takeaways

A combination of visual survey and trap trees gave the most insight into current infestation area. Most infested trees remain in the interior of Forest Grove city limits. Approximately half of the trap trees were positive at larger Sink sites on the perimeter of the infestation. No trees more than 3 miles outside of the center of infestation had evidence of EAB. Life stage distribution shows many larvae are on a 2-year life cycle, allowing more time for management and biocontrol agents to respond to this pest. An increase in exit holes and EAB density in 2024 shows the population is aging and the infestation is maturing. There is still time to respond to this infestation and slow ash mortality.







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Thank you